Claims

[c1] What is claimed is: The invention of a self-sustaining hydrogen thermolysis reactor (1) that is capable of performing all known forms of work. A hydrogen thermolysis reactor (1) is hereby claimed to dissociate water (H2O) into atomic hydrogen and atomic oxygen, which may be burned as fuel in the hydrogen thermolysis reactor (1) to provide heat for industrial uses, manufacturing, and agriculture/aquaculture purposes, space heating of buildings, lift for lighter-than-air balloons or boats or airplanes/spaceships and can produce heat to generate steam for a piston driven steam engine (3) and provide heat for a heat exchanger and/or, can supply oxygen and hydrogen to be ignited in a combustion engine (4) or to power a hydrogen fuel cell (5) or to charge a hydrogen and oxygen battery (58), use in manufacturing and chemical processes, or for storage; and, oxygen produced may be used for life support in an airplane (79) a spaceship (80) or submarine (52); and, the hydrogen thermolysis reactor (1) can produce propellant to drive turbine engines (2), jet propulsion engines (6), rockets engines (7), or hydro-jet propulsion engines (8) either in the air, over the seas, under water, or in outer space; and, these devices can produce mechanical drive to generate electricity (26), operate hydraulic pumps (10A) and hydraulic engines (10), rotate a crank shaft (42), power a transmission (35), power a compressor (54), rotate a propeller, rotate a wheel (50) or turbine (24), or perform any and all other forms of work as needed.

[c2] It is claimed that the apparatus of claim 1 can provide sufficient thrust to propel jet airplanes (79) rockets or a spaceship (80), of which the jet propulsion engines (6) or rocket engines (7) will have their own oxygen supply for combustion in outer space from the oxygen contained in the water (14) converted to fuel by the present invention, and can provide the energy needed to power automobiles, trucks, buses, trains, boats, helicopters, submarines, golf carts , jet skis or any and all other types of vehicles or apparatus.

[c3] A method and apparatus is hereby claimed whereby oxygen and hydrogen are produced from water (14) within the hydrogen thermolysis reactor (1) in claim 1 that has a hydrogen thermolysis diffuser nozzle (15) that produces hydrogen

and oxygen that is burned immediately and via the hydrogen and oxygen production nozzle (18) that is capable of producing hydrogen and oxygen to be stored in a separate hydrogen storage tank (11) and in a separate oxygen storage tank (12); and, it is hereby claimed that the hydrogen and oxygen production nozzle (18) and the hydrogen thermolysis diffuser nozzle (15) are capable of performing thermolysis of water into hydrogen and oxygen.

[c4] It is claimed that the stored hydrogen and oxygen in claim 3 can power a hydrogen fuel cell (5), be fired in a combustion engine (4), be burned in a gas-fired turbine (2), or burned to heat water into steam for a steam engine (3), or may be used in chemical and manufacturing processes or may be sold for profit.

[c5] A heat/ignition process is hereby claimed to accomplish complete thermolysis and burning of water within the hydrogen thermolysis reactor of claim 1; and,

[c6] It is claimed that a thermolysis coil (13) is located at the burning core of the hydrogen thermolysis reactor (1) of claim 1. The coil (13) is filled with ambient temperature water from a water source (14) that is forced into the coil (13) under hydraulic pressure by a hydraulic pressure system (10) using multiplication of hydraulic force. As the water travels through the coil (13), it becomes heated (gains thermal energy) from the heat (up to 10,000 deg. F.) of the hydrogen reactor's core (1) and reaches a temperature of approximately 2,500 deg. F. The water remains in a liquid state due to intense pressure, otherwise, it would become gaseous; and,

[c7] It is claimed that the water is heated by a resistance electrical current (15A) or by (87) masers or in the alternative lasers (85) of the thermolysis diffuser nozzle (15) of claim 3, just before it is ejected from the thermolysis coil (13) and becomes heated to approximately 5,000 deg. F. Most of the water will disassociate into hydrogen and oxygen within the liquid state due to extreme temperature and pressure, according to the Second Rule of Thermodynamics; and,

[c8] It is claimed that the water of claim 7 is ejected via a hydraulically operated needle valve (15B) or by an electrically operated solenoid valve (10H), located

within the thermolysis diffuser nozzle (15) of claim 3, from the high-pressure, high-temperature thermolysis coil (13) into a low-pressure, high temperature area of the thermolysis diffuser nozzle (15) and is transformed into a gaseous fuel plasma containing hydrogen, oxygen and perhaps some superheated steam. A hydraulically operated vacuum turbine (15D) within the thermolysis diffuser nozzle (15) that creates the low pressure zone is hereby claimed. It is claimed that the plasma passes through an electric arc (15C) capable of temperatures up to 90,000 deg. F. or through laser (85) beams capable of temperatures up to a million deg. F. and is further heated (converting any remaining steam into hydrogen and oxygen) and the hydrogen and oxygen is ignited by the electric arc (15C) or by the laser beams (85).

[c9] It is claimed that additional heat is available to perform work that is generated by the combustion of the hydrogen and oxygen thus ignited in claim 8. It is claimed that the heat/ignition process of the present invention as explained in claims 6 through 8 overcomes the "rapid-back reaction" because the thermally dissociated water is burned immediately, no cooling or mixing with other gases takes place. The hydrogen and oxygen fuel plasma after being ignited by the electric arc or by the lasers (85) is diffused into the superheated core of the hydrogen thermolysis reactor (1) of claim 1 and is fully combusted.

[c10] It is claimed that the heat/ignition process in claims 6 through 8 create a self-sustained cycle because the hydrogen and oxygen (thermolized water) that is burned in claims 8 and 9 provides the heat/energy to perform work, including the generation of electricity (26) for the resistance electrical current (15A) or masers (87) and electric arc (15C) or lasers (85), and to heat additional water in the thermolysis coil (13).

[c11] It is claimed that a water-jacket (16) surrounds and cools the hydrogen thermolysis reactor (1); of claim 1 and cools the thermolysis diffuser nozzle (15) consisting of an electrical heat resistance coil (15A) or masers (87) or lasers (85), a hydraulically operated needle valve (15B) or electrically operated solenoid valve (10H) and an electric arc (15C) or lasers (85); and,

[c12] water within the water-jacket (16) of claim 11 gains thermal energy (heat) from

the combustion within the hydrogen thermolysis reactor (1) and turns into steam (41)

[c13] It is claimed that the steam (41) in claim 12 can drive a piston driven steam engine (3) or may be mixed with hot exhaust gases from the hydrogen thermolysis reactor (1) of claim 1 to provide additional propellant for a gas-fired turbine (2), steam engine (3) or a hybrid gas-fired/steam turbine (17).

[c14] It is claimed that the steam (41) of claim 12 after being used in claim 13 is cooled and condensed into water (14) that is then recycled back to the hydrogen thermolysis reactor (1) of claim 1 or used as coolant in the water-jacket (16) of claim 11 in a closed cycle.

[c15] The method and apparatus as used in claim 1 is hereby claimed to produce hydrogen and oxygen for future use:

[c16] It is claimed that a portion of the water within the high-temperature (2500 deg. F.), high-pressure (in excess of 4000 p.s.i.) thermolysis coil (13) in claim 6 is diverted to be cycled into stored hydrogen and oxygen via the hydrogen/oxygen production nozzle (18) of claim 3 that is wrapped with an electric resistance heat coil (18A) or is heated by masers (87) or lasers (85) and having a hydraulically controlled needle valve (18B) or an electrically operated solenoid valve (10H) that diffuses the disassociated water into a cylinder (20) having low-pressure. The cylinder (20) is located within the core of the hydrogen thermolysis reactor (1) and remains intensely hot. It is claimed that the resistance heat coil (18A) or the masers (87) or the lasers (85) further heat the water in the thermolysis coil (13) to near 5000 deg. F., breaking the water into hydrogen and oxygen just prior to injection into the hydrogen/oxygen production cylinder (20).

[c17] A hydrogen and oxygen production cylinder (20) in claim 16, having a hydrogen permeable membrane (19) constructed of inert ceramic materials as its inner wall is hereby claimed. It is claimed that there is an annular area (20B) between the outside of the hydrogen permeable membrane (19) and the cylinders' (20) outer-most casing (20B).

[c18] It is claimed that the annular area of claim 17 has a suction provided by a high-pressure hydrogen vacuum pump (21). It is claimed that the center of the membrane has a suction created by a low-pressure oxygen vacuum pump (21A). And it is claimed that the differential in pressures between the high-pressure hydrogen vacuum pump (21) and the low-pressure oxygen vacuum pump (21A) creates lower pressure outside of the hydrogen permeable membrane (19), which aids the passage of hydrogen from inside the membrane (19) through the membrane (19) to the annular area outside the membrane (19).

[c19] It is claimed that hydrogen is allowed to pass through the membrane (19) of claim 18 into the annular area (20B) and through the high-pressure vacuum pump (21) and is pressurized into the supply pipes (11A) to a hydrogen storage tank (11) in which compressed hydrogen is stored.

[c20] It is claimed that oxygen inside the cylinder (20) in claim 17 which cannot pass through the hydrogen permeable membrane (19) is swept through the inside of the cylinder (20) and through the low-pressure oxygen vacuum pump (21A) and passes through pipes (12A) to an oxygen storage container (12) that stores compressed oxygen.

[c21] A hybrid gas-fired turbine/steam turbine engine (17) of claim 1 that burns hydrogen/oxygen plasma as a fuel being comprised solely of a hydrogen thermolysis reactor (1) in claim 1and a turbine engine (2) is hereby claimed that operates at near total efficiency by the elimination of the use of a compressor as required by prior art turbine engines

[c22] It is claimed that water is heated into steam (41) and added to the hot hydrogen and oxygen exhaust gases of the hydrogen thermolysis reactor (1) of claim 1 of the hybrid turbine (17) of claim 21 to cool the exhaust gases to such extent that the heat of the gases does not harm the hybrid turbines metallurgy.

[c23] It is claimed that the cooling of the hot exhaust gases by mixing cooler steam with the gases in claim 22 allows more fuel to be burned in the hydrogen thermolysis reactor (1) claim 1. It is claimed that the quantity of fuel that can be burned is the most limiting factor in the performance of prior art gas-fired

turbine engines. It is claimed that the present invention allows the burning of substantially greater quantities of hydrogen/oxygen fuel plasma in the hydrogen thermolysis reactor (1) than prior art turbine engine combustors are capable of burning.

[c24] It is claimed that adding steam to the hot gases in claim 22 results in a substantial increase in the amount of propellant created and therefore the amount of energy the apparatus can generate. It is claimed that steam is cooler, more dense and generates more force than is produced by thin hot exhaust gases (36).

[c25] It is claimed that the hybrid gas-fired/steam turbine engine (17) in claim 21 operates at near complete efficiency because the power turbine does not have to expend two-thirds of its energy running a compressor as in prior art gas-fired turbines engines

[c26] It is claimed that the product of burning hydrogen/oxygen fuel plasma in the hydrogen thermolysis reactor (1) of claim 1 is water vapor, which cools and condenses into water.

[c27] It is claimed that in a closed-cycle configuration of the present invention that the water in claim 26 is re-cycled into fuel and steam/propellant again.

[c28] A thermolysis diffuser nozzle (15) of claim 3 used in the hydrogen thermolysis reactor (1) of claim 1 is hereby claimed that can perform thermolysis of water (14). The thermolysis diffuser nozzle (15) further heats and ignites the water (14) in the thermolysis coil (13); and,

[c29] It is claimed that the thermolysis diffuser nozzle (15) of claim 3 consists of a resistance heating coil (15A) or masers (87) or lasers (85), a hydraulically operated thermolysis needle valve (15B) or an electrically operated solenoid valve (10H), a hydraulically operated electric arc (15C) or lasers (85), and a hydraulically operated vacuum turbine (15D) or an electrically operated vacuum pump (21).

[c30] It is claimed that water (14) in the thermolysis coil (13) is pre-heated by the

extreme temperature of the hydrogen thermolysis reactor (1) of claim 1 before entering the thermolysis diffuser nozzle (15) in claim 3. When the pre-heated water enters the nozzle (15), a resistance heating coil (15A) surrounding the first part of the nozzle (15) or masers (87) or lasers (85) further heat the water which becomes almost totally disassociated into hydrogen and oxygen just prior to injection from the nozzle (15).

[c31] It is claimed that a hydraulically operated needle value (15B) or an electrically operated solenoid valve (10H) controls the volume of disassociated water allowed to pass through the nozzle (15) in claim 28; and,

[c32] it is claimed that the thermally cracked water that is passed through the needle valve (15B) or solenoid valve (10H) in claim 31 transcends from high-pressure to low-pressure and becomes gaseous; and,

[c33] it is claimed that the hydrogen and oxygen gases of claim 32 pass through an electric arc (15C) or through laser (85) beams located within the nozzle (15) of claim 28. It is claimed that the 90,000 deg. F. temperature of the electric arc (15C) or the million deg. F. temperature of the laser (85) further heats the hydrogen and oxygen gases and ignites the gases.

[c34] It is claimed that the thermolysis diffuser nozzle (15) of claim 3 utilizes a hydraulically or electrically operated vacuum turbine (15D) of claim 29 located at the end of the diffuser nozzle (15) to create vacuum pressure within the diffuser nozzle (15) to create a zone of extremely low pressure into which the needle valve (15B) or solenoid valve (10H) of claim 31 diffuses dissociated water. It is claimed that low-pressure and high-temperature cause thermolysis of water, and it is claimed that the vacuum turbine aids the thermolysis process of breaking water into hydrogen and oxygen.

[c35] It is hereby claimed that a stand alone embodiment of the hydrogen thermolysis diffuser nozzle (15) of claim 3 may be constructed using a hydraulic pump (10A), which is a water (14) pump to pressurize water (14D) into the thermolysis diffuser nozzle (15) and the pressurized water (14D) is heated by masers (87) and/or lasers (85) that heat the pressurized water (14D) until it becomes

disassociated water (13A). It is claimed that the disassociated water (13A) passes through an electrically operated solenoid valve (10H) and enters a zone of low-pressure created by a hydraulically operated vacuum turbine (15D). It is claimed that within the vacuum zone the disassociated water (13A) transforms into hydrogen and oxygen plasma (38). It is claimed that the hydrogen and oxygen fuel plasma is further heated and is ignited by a series of lasers (85) arranged along a long, narrow opening in the diffuser nozzle (15). It is claimed that the method and process as herein described is thermolysis, the direct breaking down of water into hydrogen and oxygen by direct extreme heat and by low-pressure.

[c36] It is further claimed that the embodiment of the invention of the diffuser nozzle (15) of claim 3 as described in claim 35 may be miniaturized to the size of a spark plug and may be used to convert a conventional combustion engine into a vehicle burning disassociated water (13A) as a combustion fuel.

[c37] It is claimed that the gas tank of the conventional vehicle may be filled with water to be burned as fuel in the hydrogen thermolysis diffuser nozzle (15) of claim 35.

[c38] It is claimed that the hydrogen thermolysis diffuser nozzles (15) of claim 3 using either the resistance heat coil (15A) and electric arc (15C) embodiment or the masers (87) and lasers (85) embodiment of claim 35, as sources of heat and ignition, can accomplish thermolysis, the direct splitting of water into hydrogen and oxygen by extreme heat and low-pressure.

[c39] It is claimed that the hydrogen thermolysis diffuser nozzle (15) of claim 3 and claim 35 is capable of performing thermolysis; and,

[c40] it is claimed that the thermolysis diffuser nozzle (15) of claim 35 may be substituted for other heat producing devices, such as for providing heat for a boiler, heat exchanger, gas fired turbine (2) as in a commercial power plant producing electricity (9), or a steam engine (3), etc.

[c41] It is claimed that the hydrogen thermolysis diffuser nozzles (15) of claim 3 of both embodiments may be used as a stand alone beneficial apparatus without

the use of the hydrogen thermolysis reactor (1) of claim 1 that creates a continuous self-sustaining reaction and produces hydrogen and oxygen.

[c42] It is claimed that the hydrogen thermolysis diffuser nozzle (15) of claim 3 can retrofit any convention heating or combustion unit to operate via burning water (14) as a fuel in a thermolysis diffuser nozzle (15).

[c43] It is claimed that the hydrogen thermolysis reactor (1) can be used as a beneficial apparatus as a stand alone unit to produce heat for such applications as manufacturing, space heating of buildings, agriculture crop protection from freeze, the heating of water for aquaculture, etc., without the use of a turbine (2) or other mechanical drive device associated with the reactor (1) to perform work other than heating.

[c44] It is claimed that a hydrogen/oxygen production nozzle (18) of claim 3, along with a hydrogen and oxygen production cylinder (20) and a high-pressure hydrogen vacuum pump (21) and a low-pressure oxygen vacuum pump (21A) can accomplish thermolysis of water into hydrogen and oxygen and can directly power a fuel cell (5) or a hydrogen and oxygen battery (58) with hydrogen and oxygen produced from the water (14).

[c45] It is claimed that the hydrogen/oxygen production nozzle (18) of claim 3 can be beneficially used along with the hydrogen/oxygen cylinder (20) having a hydrogen permeable membrane (19) as a stand alone unit for the production of hydrogen and oxygen.

[c46] It is claimed that the hydrogen and oxygen production nozzle (18) of claim 3 may be constructed in a stand alone, all electric, embodiment using an electrically operated high-pressure water pump (10A) to pressurize water into the hydrogen and oxygen production nozzle and masers (87) and/or lasers (85) to heat the water (14) until it becomes disassociated water and with an electrically operated solenoid valve (10H) to diffuse the disassociated water into a zone of low-pressure created by electrically operated vacuum pumps, which create the extreme heat and low-pressure required for thermolysis. It is claimed that the hydrogen and oxygen can be separated by a hydrogen and oxygen

production cylinder (18) of claim 3 and as described in claims 16 through 18.

[c47] A hydrogen and oxygen storage battery (58) constructed of carbon 60 alloyed with platinum to act as a catalyst to break the hydrogen into protons and electrons is hereby claimed.

[c48] It is claimed that the carbon 60 of claim 47 has a molecular structure forming a sphere which surrounds elements embedded into it by heat and pressure. Further, it is claimed that hydrogen atoms can be stored in carbon 60 and that oxygen atoms can be stored in carbon 60 molecules.

[c49] It is claimed that the carbon 60 of claim 47 can be alloyed with platinum to create a new material having additional electrochemical properties not available in carbon 60 alone.

[c50] It is claimed that the platinum of claim 49 acts a as catalyst to break hydrogen into electron and protons (hydrogen ions); and,

[c51] it is claimed that a hydrogen and oxygen battery (58) of claim 47 capable of storing hydrogen and oxygen and of producing electricity can be constructed of the carbon 60/platinum alloy (104).

[c52] The invention of a hydrogen and/or oxygen storage battery (58) of claim 47 is hereby claimed and the battery may be constructed of materials other than carbon 60/platinum alloy (104) and such other embodiments and the storage of gases other than hydrogen and oxygen are considered to be within the scope of the present invention of the battery.

[c53] It is claimed that the hydrogen and oxygen battery (58) of claim 47 is capable of powering a vehicle and/or of producing electrical power for any other purpose such as to operate equipment, supply electricity (9) for a home or business or for the commercial generation of electricity (9).

[c54] It is claimed that the hydrogen and oxygen battery (58) of claim 47 is an improvement to the prior art of a fuel cell because the hydrogen and oxygen battery (58) stores hydrogen and oxygen for future use; and, it is claimed that a charged hydrogen and oxygen battery (58) is capable of the immediate delivery

of electricity (9), without having a supply of hydrogen and oxygen as is needed by a prior art fuel cell. It is claimed that hydrogen and oxygen required to produce electricity (9) is stored in the carbon 60/platinum alloy (104) of the hydrogen and oxygen battery (58).

[c55] It is claimed that the hydrogen and oxygen battery (58) of claim 47 of the present invention is more lightweight and is more powerful than batteries of the prior art. It is claimed that the hydrogen and oxygen battery (58) can supply more power faster than a fuel cell or a battery of the prior art because there are more hydrogen ions available for the production of electricity in the hydrogen battery than are made available be a fuel cell (5) or by a prior art battery.

[c56] It is claimed that a hydrogen and oxygen battery (58) of claim 47 in association with a hydrogen and oxygen production nozzle (18) of claim 46 is capable of producing electricity (9) on a continuous basis. It is claimed that the hydrogen and oxygen battery (58) can power the hydrogen and oxygen production nozzle (18) of claim 46; and, it is claimed that the hydrogen and oxygen produced can be separated into by the hydrogen production cylinder (20); and, it is claimed that the hydrogen vacuum pump (21) and the oxygen vacuum pump (21A) can pressurize hydrogen and oxygen into the hydrogen and oxygen battery (58); and, it is claimed that the hot hydrogen gas and hot oxygen gas pressurized into the battery will charge the battery with hydrogen and oxygen. It is claimed that all of the components needed to produce hydrogen and oxygen are operated by electricity (9) obtained from the hydrogen and oxygen battery. It is claimed that the charged hydrogen and oxygen battery (58) can produce electricity (9); and, it is claimed that the hydrogen and oxygen battery (58) can continuously produce electricity (9) with the hydrogen and oxygen production nozzle (18) available to re-charge the hydrogen and oxygen battery (58) with hydrogen and oxygen when it needs additional hydrogen and oxygen.

[c57] It is hereby claimed that hydrogen and oxygen battery (58) of claim 47 along with the hydrogen and oxygen production nozzle (18) and hydrogen and oxygen production cylinder (20) as described in claim 53 can produce electricity (9) on a continuous basis; and, therefore, it is claimed that the apparatus may

be used as an electric generator (26).

[c58] The invention of an apparatus for the multiplication of hydraulic force as used in the hydrogen thermolysis reactor of claim 1 is hereby claimed.

[c59] A unique mirrored cylinder and piston arrangement to continuously pump high pressure water for multiplication of hydraulic force of claim 58 is hereby claimed. Two sets of pistons and two sets of cylinders are claimed that consists of two small diameter cylinders and pistons and two large diameter cylinders and pistons. One set of pistons and cylinders form an end-to-end mirror image of the other pair of cylinders and pistons. A rod connects the two small diameter pistons and a rod connects the two large diameter pistons. As one small diameter piston moves back and its cylinder is refilled with water, the other small diameter piston moves forward. One large diameter piston moves back and its cylinder is refilled with water as the other large diameter piston moves forward.

[c60] A hydraulic pump (10A) used in the hydrogen thermolysis reactor (1) of claim 1 is hereby claimed that pumps hydraulic fluid (water) to the small diameter pistons of claim 59.

[c61] Electrically operated solenoid valves (10H) are claimed that switch the flow of hydraulic fluid (water) of claim 60 back and forth between the two small diameter cylinders; and, it is hereby claimed that the large diameter cylinders continuously pump high pressure water as the hydraulic fluid is switched back and forth because the small diameter cylinders force the large diameter cylinders forward to pump pressurized water. It is claimed that when one large diameter cylinder stops pumping water, the other large diameter cylinder starts pumping water. The large diameter cylinder that stops pumping water is drawn back by the connecting rod and is refilled with water while the other large diameter piston is pumping, then the process reverses again.

[c62] A unit to test the principal of thermolysis of water by a heat/ignition process as is claimed in claim 1 is hereby claimed. A pressure vessel constructed of pressure rated material that can withstand a pressure of 10,000 p.s.i. is

claimed. The vessel is half filled with water. A blowtorch to heat the water is claimed. Material weaker than the material of the vessel is claimed. The blowtorch heats the water until steam forms above the water and builds pressure until the weaker material ruptures.

[c63] A hydrogen thermolysis nozzle (15) directed back at the pressure vessel is claimed. The nozzle consists of a heat resistance coil wrapped around it to further heat the steam until it becomes hydrogen and oxygen fuel plasma. An electric arc that further heats and ignites the fuel plasma is hereby claimed.

[c64] A piston driven hydraulic engine that uses multiplication of hydraulic force as described in claim 58 is hereby claimed. Rods are hereby claimed that connect the large pistons of claim 59 to cams mounted on a crankshaft to generate rotary motion.

[c65] It is claimed that multiplication of hydraulic force of claim 58 allows the hydraulic engine of the present invention to develop greater force than prior art hydraulic engines.

[c66] It is claimed that the hydraulic engine described in claim 59 has two crankshafts that may be connected to wheels at each end, creating a four-wheel drive vehicle, of greater power and traction.

[c67] A hybrid steam engine/hydraulic engine using multiplication of hydraulic force of claim 58 is hereby claimed. It is claimed that small pistons drive larger pistons with multiplication of hydraulic force as described in claim 58. The small pistons are driven by steam and the force exerted on the steam is transferred to the large pistons by hydraulic fluid connecting the two pistons; and, the force of the steam exerted on the small piston is multiplied by the force exerted by the large piston.

[c68] It is claimed that the steam of claim 67 travels at a faster speed than does hydraulic fluid. The force of the steam is multiplied by the hydraulic multiplication of force of claim 58; therefore, the engine is faster than a hydraulic engine and is more powerful than a steam engine. It is claimed that the hybrid steam/hydraulic engine of the present invention is faster and more

powerful than prior art engines.

[c69] It is claimed that the hydrogen thermolysis reactor (1) in claim 1. can provide hydrogen and oxygen to power a hydrogen fuel cell.

[c70] Further it is claimed that the hydrogen thermolysis reactor of claim 1. can power a vehicle whose engine consists of a hydrogen thermolysis reactor (1), a hydrogen fuel cell (5), an electric motor and a transmission with accessory components.

[c71] It is claimed that a hydrogen thermolysis reactor (1) of claim 1 can produce hydrogen and oxygen that is used by the fuel cell to electrochemically produce electricity that runs an electric motor that drives a transmission to propel vehicles, boats or other apparatus.

[c72] It is claimed that the hydrogen thermolysis reactor of claim 1 can produce hydrogen and oxygen that can be burned in a combustion engine; and, it is claimed that the hydrogen thermolysis diffuser nozzle (15) and the hydrogen and oxygen production nozzle (18) of claim 3 can also produce hydrogen and oxygen that can be burned in a combustion engine.

[c73] It is claimed that the hydrogen thermolysis reactor of claim 1 can power a vehicle whose engine consists of the hydrogen thermolysis reactor, a conventional combustion engine, and a transmission and the normal accessory components of a vehicle such as an alternator, battery, etc.

[c74] It is claimed that the product of burning hydrogen and oxygen in the combustion engine of claim 72 is water vapor that condenses into water.

[c75] It is claimed that the hydrogen thermolysis reactor of claim 1. can power a jet propulsion engine (6). It is claimed that jet propulsion engines powered by hydrogen thermolysis reactors can fly into outer space because the oxygen for combustion within the jet engines is contained in the fuel (water) that is converted into hydrogen and oxygen.

[c76] An airplane/spaceship powered by jet propulsion engines using hydrogen thermolysis reactors of claim 75 consisting of one large wing is hereby claimed.

[c77] It is claimed that a hydrogen thermolysis reactor of claim 1. can produce heat that can be placed in the annular space of the wing of the airplane of claim 76 to cause the airplane/spaceship to be lighter-than-air in the earth's atmosphere.

[c78] It is claimed that the airplane/spaceship of claim 76 is powered by jet propulsion engines (6) operating off of hydrogen and oxygen and that hot air is injected into the wings of the airplane creating lift and that jet propulsion engines thrust downward causing upward lift of the airplane; and, it is claimed that a lighter-than-air airplane is created.

[c79] It is claimed that the airplane/spaceship in claim 76 can take-off without the use of a runway. It is claimed that the airplane can lift-off the ground vertically and remain level with the aid of a gyroscope leveling device controlling four vertical-lift jet propulsion engines located at the four corners of the wing.

[c80] A hydraulically operated landing gear of the airplane/spaceship in claim 76 is hereby claimed that has a hydraulic ram within a cylinder capable of lowering a landing gear. It is claimed that the airplane lands vertically and lowers a hydraulically controlled landing gear in order to land.

[c81] It is claimed that the airplane/spaceship in claim 76 uses water as fuel; and, it is claimed that the water is obtained from water vapor in the atmosphere.

[c82] It is claimed that the water of claim 81 is created by an air liquidification and refrigeration cycle. It is claimed that the gaseous air in the earth's atmosphere is compressed and is cooled and is transformed into a liquid by a change of state. It is claimed that the super cold liquid is passed through a heat exchange coil and that condensation forms on the coil. It is claimed that air from outside the airplane passes over the coil to cause condensation. It is claimed that the condensation is water, which is collected to operate the airplane's engines.

[c83] It is claimed that once the airplane/spaceship of claim 76 is in flight that additional lift is created by the motion of air over the wing. It is claimed that the airplane with the aid of the additional lift can support the additional weight of water produced from water vapor in the air. It is claimed that the water is stored

in cells in the wing. It is claimed that when the wing contains sufficient water (fuel), the airplane/spaceship can fly into space using the water as fuel, burning the hydrogen and oxygen produced from the water by the hydrogen thermolysis reactor in the jet propulsion engines to create thrust in space without the need for oxygen from the atmosphere.

[c84] A hydraulically operated adjustable rocket nozzle is claimed to control the exit velocity of the hot gases created by the jet propulsion engines of the airplane/spaceship of claim 76. It is claimed that in space, the greater the exit velocity, the greater the forward thrust.

[c85] It is claimed that the hydrogen thermolysis reactor of claim 1 can produce oxygen to be used by the crew and passengers of the airplane/spaceship of claim 76 for life support.

[c86] An air bag that can be installed in space is claimed to capture the propellant of the jet propulsion engines of the airplane/spaceship of claim 76. It is claimed that the propellant of the jet propulsion engine is water vapor that will into water that can be captured by the air bag for recycle as fuel or as oxygen for life support.

[c87] It is claimed that glass panels are located in the wing of the airplane/spaceship of claim 76 to allow light into the wing and that the light will allow micro-algae or other plant life to grow in the water contained in the wing. It is claimed that oxygen and protein used for life support during long stays in space may be produced by the micro-algae or the other plants growing in water in the wing of the airplane/spaceship.

[c88] It is claimed that the airplane of claim 76 is also a space ship. The airplane/space ship can fly through the atmosphere into space with oxygen for life support and oxygen to combust hydrogen in the jet propulsion engines being produced by the hydrogen thermolysis reactor from water that is transformed into hydrogen and oxygen.

[c89] Heat shields made of ceramic tiles located on the underside of the airplane/spaceship of claim 76 are claimed to control the heat of re-entry into

the atmosphere.

[c90] It is claimed that the airplane/spaceship of the present invention of claim 76 can fly into the upper reaches of the atmosphere and into outer space with no damage caused to the ozone layer as in prior art conventional upper atmosphere jet propulsion engines emitting damaging effluents.

[c91] It is claimed that the jet propulsion engines of claim 78 of the present invention can fly into the upper atmosphere with their own oxygen supply; and, it is claimed that the air is less dense in the upper atmosphere and gravitational pull is reduced, creating the ability for the airplane/spaceship to fly at faster speeds in the upper atmosphere and in outer space.

[c92] It is claimed that the airplane/spaceship of claim 76 of the present invention can carry greater volumes of passengers and cargo due to the lift provided by the hot-air lift in the air-foil and the downward thrust of the jet propulsion engines inside the air-foil, providing the capability to carry greater loads than prior art airplanes and/or spaceships.

[c93] It is claimed that the airplane/spaceship of claim 76 of the present invention beneficially combines the lift characteristics of a hot-air balloon, a conventional airplane, and a Harrier Jet's downward thrust for vertical lift-off and vertical landing.

[c94] A hydrogen thermolysis reactor (1) of claim 1 powered boat is hereby claimed that is a lighter-than-air boat consisting of two hulls with a large airfoil overhead and with crosswalks between the two hulls. Jet propulsion engines operating off of hydrogen and oxygen produced by the hydrogen thermolysis reactor are claimed that create thrust to propel the boat and that inject heat into the air foil and create lift by downward thrust.

[c95] It is claimed that the boat of claim 94 is very stable in water because it is as wide as it is long, creating wave averaging over the hull cross-section in water and because the air-foil moderates wave action because it provides lift from the air moving steadily across it that does not allow the boat of the present invention to pound up and down as a conventional ship does.

[c96] It is claimed that the boat of claim 94 is partly supported by water by its hulls and partly supported by air with hot-air lift from the airfoil and downward thrust lift from the jet propulsion engines in the airfoil.

[c97] It is claimed that the boat of claim 94 of the present invention has less draft than prior art boats because the boat is provided with several mechanisms for lift. Therefore, it is claimed that the boat of the present invention can carry passengers and cargo over waters too shallow for prior art boats; and, it is claimed that the boat of the present invention can carry greater volumes of passengers and cargo.

[c98] Three forms of lift are claimed in the boat of claim 94: hot-air lift inside the air-foil, downward thrust of the jet propulsion engines creating upward lift, and motion of air over the air-foil creating lift. It is claimed that the boat is constructed of strong, lightweight materials such as aluminum and titanium alloy. It is claimed that the boat can be lifted out of the water by hot air in the airfoil so long as there is no load of cargo or passengers aboard. It is claimed that the boat can lift itself from the water for purposes of repair and docking and to prevent bio fouling of the hulls, so long as loads of cargo and passengers are not present.

[c99] It is claimed that the boat of claim 94 loaded with cargo and passengers can travel on the surface of the water on skis mounted on the underside of the boat. It is claimed that as the boat moves forward and gains sufficient speed that additional lift will be generated by the motion of air over the airfoil and that the boat will raise to the surface of the water on skis mounted underneath it.

[c100] It is claimed that the hydrogen thermolysis reactors of claim 1 of the boat of claim 94 operate hydro-jet attachments below the water line of the boat to create hydro-jet propulsion underneath the boat to thrust the boat forward.

[c101] It is claimed that jet propulsion engines operate in the air to create forward thrust and that hydro-jet propulsion turbines operate under the water to thrust the boat of claim 94 forward and that jet propulsion engines located within the wing inject heat into the airfoil in order to create hot-air lift for the boat, as the

jet propulsion engines thrust downward causing upward lift.

[c102] It is claimed that the hydro-jet propulsion turbines rise out of the water when the boat of claim 94 lifts up on the skis and that having the turbines out of the water creates less drag for high-speed travel.

[c103] A hydraulically operated airfoil pitch adjustment is claimed to control the pitch of the airfoil to maximize lift when needed and to prevent the boat of claim 94 from going air-borne at high speeds.

[c104] It is claimed that the boat of claim 94 can achieve speeds on water approaching that of jet aircraft in the air.

[c105] A hydraulically operated water pick-up tube is claimed to retrieve water from the ocean for use by the boat of claim 94. It is claimed that the water pick-up tube can be lowered below the water line to obtain seawater when seawater is needed.

[c106] An air liquidification and refrigeration process to remove water vapor from the air for use on the boat in claim 94 is claimed. It is claimed that the boat in claim 94 uses water as fuel and that a portion of the water is obtained from moisture in the atmosphere.

[c107] An air liquidification and refrigeration cycle is claimed to produce water for use on the boat in claim 94. It is claimed that the gaseous air is compressed and is cooled and is transformed into a liquid by a change of state. It is claimed that the liquid is passed through a heat exchange coil and that condensation forms on the coil. It is claimed that air from outside the boat passes over the coil to cause condensation. It is claimed that the condensation forms fresh potable water, which is collected to operate the boat's engines and for other uses.

[c108] A jet propulsion engine of claim 78 powered by a hydrogen thermolysis reactor is hereby claimed consisting of a compressor turbine, a hydrogen thermolysis reactor, and a power turbine. It is claimed that air is compressed into the hydrogen thermolysis reactor by the compressor turbine, and the air is combusted along with hydrogen and oxygen produced by the reactor. It is

claimed that the hot exhaust gases are expanded in the power turbine to create mechanical drive. It is claimed that the rearward thrust of the jet propulsion engine can create forward thrust that can propel an airplane, spaceship, boat, personal transport vehicle, rocket, or submarine, etc.

[c109] It is claimed that air from the compressor turbine of claim 108 is allowed to go around the outside of the hydrogen thermolysis reactor and the power turbine for cooling purposes.

[c110] It is claimed that the jet propulsion engine of claims 78 and 108 works in conjunction with an air liquidification and refrigeration cycle that produces water and super-cold liquid atmosphere products, such as liquid nitrogen, liquid oxygen, and liquid rare gases found in the atmosphere

[c111] It is claimed that the liquid nitrogen of claim 110 and other super-cold liquids from the atmosphere are injected into the inlet of the power turbine to create further cooling of the turbine and to increase the volume of propellant discharged. It is claimed that by making the power turbine operate cooler that more hydrogen and oxygen fuel may be burned in the reactor; and, more fuel increases the volume of propellant available to the power turbine, making the jet propulsion engine more powerful than prior art jet propulsion engines.

[c112] It is claimed that the jet propulsion engine of claims 78 and 108 of the present invention can operate, provide thrust, under water and can operate, provide thrust, beyond the earth's atmosphere because combustion can occur with hydrogen and oxygen obtained from water, which is the fuel of the jet propulsion engine of the present invention.

[c113] It is claimed that the jet propulsion engine of claims 78 and 108 can power a boat, submarine, jet airplane, personal transport vehicle, rocket, or spaceship and can operate in air, on water, under water, or in space because it has its own supply of oxygen contained in its fuel, water.

[c114] A hydro-jet propulsion turbine is hereby claimed that is driven be the power turbine of a hydrogen thermolysis reactor of claim 1. It is claimed that the hydro-jet propulsion turbine is a hydro-compressor turbine that compresses

water that exits the hydro-compressor turbine as a focused water-jet stream capable of creating substantial thrust.

[c115] A hydraulically operated hydro-jet nozzle is claimed to control the velocity of the water jet stream exiting the hydro-jet turbine of claim 114 and to provide steering. It is claimed that the backward jet action of the water causes forward thrust on the boat to propel it forward.

[c116] A submarine powered by hydrogen thermolysis diffuser nozzles of claim 3 is hereby claimed that heats water that is withdrawn from the sea at the nose of a submarine to reduce nose compression until the water becomes steam. It is claimed that the steam is expanded through a power turbine and creates rotary motion of the power turbine. It is claimed that the exiting steam creates backward thrust that causes forward motion of the submarine.

[c117] It is claimed that the submarine of claim 116 of the present invention has less nose resistance than prior art submarines because a large volume of water to create steam to drive the power turbine is withdrawn at the nose of the submarine reducing nose compression of water and resulting in reduced resistance of forward motion of the submarine.

[c118] A compressor turbine located at the nose of the submarine of claim 116 is hereby claimed that compresses water, withdrawn at the nose of the submarine to reduce resistance to forward motion by the submarine, into steam tubes running longitudinally through the submarine. It is claimed that the water in the steam tubes receives heat from the combustion of hydrogen and oxygen by the hydrogen thermolysis diffuser nozzles and that the water changes state from liquid to gaseous and becomes steam.

[c119] It is claimed that the steam of claim 118 drives a power turbine and provides rearward thrust to the submarine of claim 116. It is claimed that the steam exists the steam tubes and at the inlet to the power turbine and expands across the power turbine exerting force against the vanes of the power turbine creating rotary motion; and, it is claimed that the rotary motion is transferred to a central shaft connected to the power turbine.

[c120] A central shaft and a clutch/gear box are hereby claimed that transfer mechanical drive from the power turbine to the compressor turbine along the central shaft of claim 119. It is claimed that the clutch/gear box allows the compressor turbine to be disconnected during start-up of the power turbine and allows mechanical drive to be obtained from the power turbine for use aboard the submarine to operate electrical generators, etc.

[c121] An alternate design of a submarine powered by hydrogen thermolysis reactors of claim 1 with attached hydro-jet propulsion turbines of claim 114 is hereby claimed.

[c122] It is claimed that water is withdrawn from the ocean at the nose of the submarine of claim 121 to reduce nose compression of the water and to reduce resistance to forward motion of the submarine; and, it is claimed that the water is allowed to travel longitudinally the entire length of the submarine and passes through a hydro-jet compressor turbine that compresses the water into a water-jet stream that exits the hydro-jet propulsion turbine through a hydro-jet nozzle.

[c123] It is claimed that the submarine of claim 121 is powered by two hydrogen thermolysis reactors of claim 1 that drive the hydro-jet propulsion turbine with the use of gears. A drive gear is claimed that transfers rotary motion from the power turbine of the thermolysis reactor to a jet-propulsion gear that turns the hydro-jet propulsion turbine. A clutch gear is claimed that is located between the drive gear and jet-propulsion gear that engages or disengages the drive gear and jet propulsion gear. It is claimed that the two hydrogen thermolysis reactors are located on each side of the jet propulsion turbine and that the reactors apply force to each side of the jet propulsion gear to drive the jet propulsion turbine.

[c124] A hydraulically controlled hydro-jet nozzle is hereby claimed that controls the exit velocity of the water-jet stream that exits the hydro-jet propulsion turbine of claim 123 . It is claimed that the hydraulically operated hydro-jet nozzle is capable of maneuvering from side-to-side and aids in steering the submarine.

[c125] It is claimed that the submarine of claim 121 is propelled forward by the thrust of the hydro-jet propulsion turbine with the hydro-jet nozzle directing the backwards thrust of the water-jet; and, the thrust of the two hydrogen thermolysis reactors that thrusts propellant backwards through jet propulsion nozzles.

[c126] A check valve is hereby claimed that prevents water from entering the hydrogen thermolysis reactor of claim 1 in the undersea environment of the submarine of claim 121. It is claimed that the check valve allows flow in only one direction to allow hot exhaust gases to exit from the reactor. It is claimed that the check valve prevents water from entering the reactor.

[c127] A hydraulically operated jet propulsion nozzle is claimed to control the exit velocity of the exhaust hot gases of the hydrogen thermolysis reactor of claim 1 and to steer the submarine of claim 121.

[c128] It is claimed that a hydrogen and oxygen production nozzle (18) of claim 3 using a hydrogen and oxygen production cylinder to separate the hydrogen and oxygen produced by the hydrogen and oxygen production nozzle can power a fuel cell and can provide hydrogen and oxygen to charge a hydrogen battery or a hydrogen and oxygen battery

[c129] It is claimed that the fuel cell and the hydrogen and oxygen battery (58) of claim 47 can produce electricity that can operate an electric motor or any other electric apparatus.

[c130] It is claimed that thermolysis of water is accomplished by high-temperature and low-pressure; and, it is claimed that the hydrogen and oxygen production nozzle (18) of claim 3 can accomplish thermolysis of water to disassociate water into hydrogen and oxygen. It is claimed that masers and/or lasers heat the water until it is disassociated into hydrogen and oxygen.

[c131] A high-pressure water pump is hereby claimed to pressurize the water into the hydrogen and oxygen production nozzle (18) of claim 3.

[c132] A hydrogen and oxygen production cylinder is hereby claimed to separate

hydrogen and oxygen produced by the hydrogen and oxygen production nozzle (18) of claim 3.

[c133] It is claimed that an electrically operated solenoid valve diffuses disassociated water being hydrogen and oxygen into a hydrogen and oxygen production cylinder of claim 132.

[c134] It is claimed that an oxygen molecule of claim 133 is many times larger than a hydrogen molecule and that a hydrogen molecule can pass through an opening (membrane) that an oxygen molecule cannot pass through. Further, it is claimed that the lighter hydrogen molecule diffuses at a faster rate than the heavier, slower oxygen molecule.

[c135] A hydrogen permeable membrane that is located inside the hydrogen and oxygen production cylinder of claim 132 is hereby claimed that allows hydrogen to be separated from oxygen. It is claimed that an annular area is created outside of the membrane between the membrane and the outer-most casing of the hydrogen and oxygen production cylinder of claim 133.

[c136] A hydrogen vacuum pump is hereby claimed to create a vacuum in the annular area outside the membrane of claim 135 that aids by sucking/drawing through the hydrogen permeable membrane to the outside of the membrane and to compress the hydrogen into the fuel cell or the hydrogen battery. It is claimed that the hydrogen vacuum pump operates at high pressure and creates a substantial vacuum to aid the hydrogen in passing through the hydrogen permeable membrane and that the hydrogen vacuum pump compresses hydrogen into a fuel cell or hydrogen battery with high-pressure.

[c137] An oxygen vacuum pump is hereby claimed that creates a vacuum in the center of the hydrogen permeable membrane of claim 136 that helps thermolysis take place by lowering the pressure within the membrane. Oxygen, which cannot pass through the hydrogen permeable membrane, is compressed into a fuel cell to operate the fuel cell or is compressed into a hydrogen and oxygen battery to charge the battery with oxygen.

[c138] It is claimed that the oxygen vacuum pump of claim 137 operates at lower

vacuum pressure than the vacuum pressure of the hydrogen vacuum pump of claim 136. The differential pressure, with lower pressure being outside of the hydrogen permeable membrane of claim 136 than inside the membrane, aids in the passage of hydrogen through the membrane.

[c139] It is claimed that the hydrogen production cylinder of claim 133 and the hydrogen and oxygen production nozzle of claims 3 and 128 are located within a highly insulated container to maintain the heat that is produced by the masers and/or lasers, which is necessary for thermolysis to take place.

[c140] A personal transport vehicle (PTV) designed to carry from one to eight passengers using hydrogen thermolysis reactors of claim 1 that power jet propulsion engines of claim 108 is hereby claimed. It is claimed that the personal transport vehicle has lift provided by hot air contained in an annular area at its roof and lift is also created by downward thrusters located in the four corners of the PTV. It is claimed that the personal transport vehicle is capable of vertical lift-off via the lift provided by the hot air and the downward thrusters creating upward lift. It is claimed that the PTV has forward and rearward thrusters located at each end of the vehicle, which are jet propulsion engines, to propel it forward and rearward and to create a braking action to stop momentum in a given direction. It is claimed that the jet propulsion engines of the PTV operate off of water as a fuel via hydrogen thermolysis reactors of claim 1; and, it is claimed that a water reservior stores water below the floor of the passenger compartment. A swivel motor is claimed to allow the jet propulsion engines to swivel from side-to-side to steer the PTV. A computer controlled gyroscope device is hereby claimed to keep the PTV level during lift-off and during flight above the ground by controlling the downward thrust of the four thrusters located on the four corners of the vehicle.

[c141] It is claimed that the personal transport vehicle of claim 140 uses hydraulically lowered wheels for traveling on conventional roadways and the wheels have convention brakes used during land operation. It is claimed that the PTV is equipped with a landing gear for landing in open fields or other sites, including roadways. It is claimed that the landing gear has shock absorbers to cushion

landing on the landing gear and to prevent damage to the PTV.

[c142] It is claimed that the PTV of claim 140 uses an air liquidification and refrigeration cycle in order to provide water to operate the hydrogen thermolysis reactors of the jet propulsion engines and to cool the jet propulsion engines and to provide cooling for the passenger compartment of the PTV. It is claimed that heating is provided by the hot exhaust gases of the jet propulsion engines used in a heat exchanger in the passenger compartment.

[c143] It is claimed that the personal transport vehicle of claim 140 is capable of traveling above the ground in the lower atmosphere and that the building of roadways is not necessary for its use, which lessens the environmental impact of habitat destruction for roadways, the death of millions of animals killed on roadways, and eliminates the need for costly road construction and road maintenance.

The burning of disassociated water as a direct fuel via a HYDROGEN THERMOLYSIS REACTOR, which sustains a continuous thermolysis reaction that generates energy in the form of heat and produces hydrogen and oxygen. Thermolysis process to disassociate water molecules into atomic hydrogen atoms and atomic oxygen atoms in a heat/ignition process in an onboard, self-sustained cycle, producing propellant or steam to power turbine engines or steam engines for mechanical drive, or to power jet propulsion engines, rocket engines, or hydro-jet propulsion engines; and, the production of hydrogen and oxygen to power a hydrogen fuel cell or to charge a hydrogen and oxygen battery, or hydrogen and oxygen to fire a combustion engine and/or for commerce.